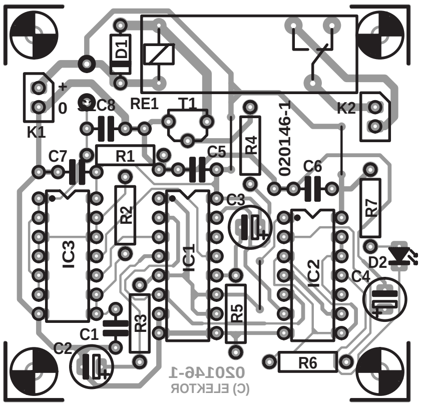
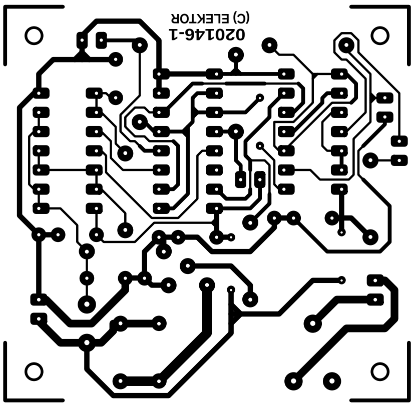
Secure On/Off Pushbutton





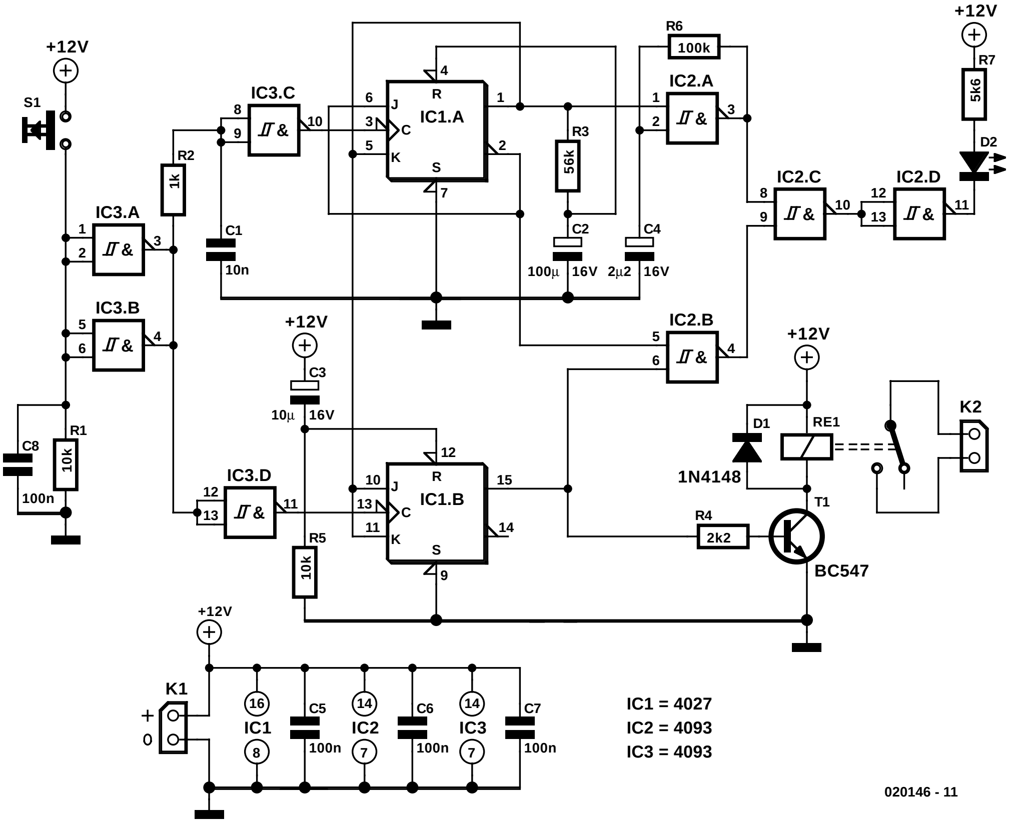
L. Libertin

The author used to employ a switching central that allows mains appliances among his PC equipment to be individually switched on and off by pressing pushbuttons. One of these pushbuttons switches the PC on and off. Good economics, but not perfect, because awkward situations can arise when a wrong pushbutton is pressed, causing the PC to be switched off instead of, say, powering up the printer.

A solution was found in the use of relay which is switched on and off only if the relevant pushbutton is pressed twice within a certain period. The first press causes a LED inside the pushbutton to flash for about 7 seconds. If you press again within this period, the relay is energised and the LED lights permanently. The switch-off procedure is identical. In this way, the switch is given a level of security.

After the first press on S1, IC1.A is switched on and the resulting state is indicated by D2 starting to flash in the rhythm defined by oscillator IC2.A. The flash rate is determined by components R6 and C4. At the same time, the second flip-flop IC1.B is enabled via its J/K inputs. Capacitor C2 is slowly charged via R3. Once the switching threshold is reached, flip-flop IC1.A is reset again.

Within this period, the pushbutton has to be pressed again. IC1.B, now operating as a data flip-flop (toggling on the positive pulse edge), toggles



COMPONENTS LIST

Resistors:
R1,R5 = 10kΩ
R2 = 1kΩ
R3 = 56kΩ
R4 = 2kΩ2
R6 = 100kΩ
R7 = 5kΩ6

Capacitors:
C1 = 10nF 5mm lead pitch
C2 = 1000µF 16V radial
C2 = 100µF 16V radial
C2 = 2µF2 16V radial
C5-C8 = 100nF

Semiconductors:
D1 = 1N4148
D2 = LED, red, low current
T1 = BC547
IC1 = 4027
IC2,IC3 = 4093

Miscellaneous:
K1, K2 = solder pin
Re1 = relay, 12V (e.g. Siemens V23057-12V)
S1 = pushbutton, 1 make contact

and causes the relay to be energised. Also, IC2.B then causes D2 to light constantly (or remain off when the relay is switched off). Capacitor C3 ensures that the relay contact can not close of its own should the mains voltage disappear.

The circuit may be built on a PCB of which the layout is shown here. As usual the artwork file may be obtained from the Free Downloads section of the Publishers' website.

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